

SUMMARY

Transfusion-related adverse events associated with the presence of leukocytes in administered blood components, though the advancement in the methods of preparation and laboratory control, still remain challenging in everyday clinical practice. The risk of their occurrence can be efficiently reduced utilizing special anti-leukocyte filters. The mechanism of their function involved sieve-effect as well as adhesion of cells to fibers of the filter. However, mechanical cell's destruction, shear stresses and different biological processes may lead to platelets activation.

The aim of the study was to compare the efficiency of different laboratory filters in removing leukocytes from platelet concentrates and to determine the influence of filtration on the quality of leukodepleted platelet concentrates.

Pooled platelet concentrates (PPC) prepared from whole blood collected from 168 volunteers. One dose of PPC was isolated from 6 units of buffy coats. PPC were suspended in additive solution SSP+ (Macopharma, France). Three commonly used filters: Fresenius BioP, Pall Medical LRP 10 i Terumo Hemocare IMUGARD III-PL were utilized to gain leukocytodepleted PPC. The process of filtration was conducted in the same temperature to unify the conditions for assessing each filter.

The blood samples were collected directly from the container with PPC before and right after filtration. The complete blood count was determined using hematological analyzer Pentra 80 (ABX, France), the leukocyte count was assessed by flow cytometry method using Facscalibur cytometer (Becton Dickinson, USA) and BD Leucocount Kit, (Becton, Dickinson USA). The expression of CD62P, CD63, CD42b antigens was determined using the same cytometer. To assess the normality of data distribution W-Shapiro test was used. For normal data distribution Student t-test or ANOVA test were utilized. For non-parametric data Mann-Whitney or Kruskal-Wallis test were applied. All statistical analyses were performed in GraphPad Prism 7.4 Software (GraphPad Prism 9.4.1 Software, USA). Statistical significance was determined as $p < 0.05$.

All filters investigated in the study allowed to receive the quality of leukodepleted PPC compliant with binding requirements for the solution, and their efficiency in removing leukocytes was assessed in study groups as 99.99%. Terumo Hemocare IMUGARD III-PL filters required the longest time to filtrate the same volume of PRP in comparison to filters Fresenius BioP, Pall Medical LRP 10. The highest loss of volume of PRP was observed for Fresenius BioP filter, and the lowest for Terumo. However, the difference was not statistically

significant. It was also demonstrated that the amount of loss of thrombocytes as well as the percentage loss of thrombocytes were significantly higher when Fresenius BioP system was used for filtration.

It was also proven that neither of system had significant influence on the size of the platelets and its distribution. It is worth noting that filtration with Fresenius BioP system was associated with more pronounced fluctuations in mean platelets volume and anisocytosis in comparison to Terumo and significantly highest changes in PCT as well. The process of filtration has no effect on expression of antigens CD42b, CD62P and CD63. Presented relations had not statistically significance.

Conclusions:

1. The efficiency of removing leukocytes from platelet concentrates is very high in general, independently on system applied.
2. The process of filtration leads to the loss of thrombocytes and the amount is associated with the system which was utilized.
3. It cannot be excluded that the amount of thrombocytes lost during filtration may be associated with their activation and adhesion during process.
4. Filtration leads to changes in thrombocyte morphology. The degree of changes depends on particular filter which was utilized.
5. Choosing the system for leukodepletion one should take into consideration potential for activation of thrombocytes, the amount of thrombocytes lost and the time of procedure.